REMARKS

The Office Action dated March 17, 2011 has been received and carefully noted. The above amendments and the following remarks are being submitted as a full and complete response thereto. Claims 1-4, 6, 7, 10-18, 21, 22 and 24-33 are pending. By this Amendment, Claim 32 is amended to depend from Claim 1. Support for the amendment can be found in the application as originally filed. The Applicant respectfully submits that no new matter is presented herein.

Entry of Response Proper

Entry of this Amendment is proper under 37 C.F.R. §1.116 since the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not raise any new issues requiring further search and/or consideration on the part of the Examiner as the Amendment merely corrects a clerical error, wherein Claim 32 should depend from Claim 1 rather than Claim 4; (c) satisfy a requirement of form asserted in the previous Office Action; (d) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The Amendment is necessary and was not earlier presented because it is made in response to objections raised in the Final Rejection. Entry of the Amendment is thus respectfully requested.

Response to Examiner's Arguments

With respect to the declaration of Eng. Massimo Malavasi, the Applicant respectfully disagrees with the Examiner's opinion that the declaration "is not persuasive because the submission only shows that the applicant's invention works."

The Applicant's opinion in the declaration is indeed persuasive in showing that the combination of features of pending independent process claim 1 produces a very low TOC and negligible volatile ash content in the combustion fumes at the mouth of the reactor. The Office Action fails to cite a single passage of the cited prior art dealing with the solution of the technical problem of the present invention. Rather, the combination of references cited by the Office Action to allege obviousness is based only on hindsight with only the knowledge of the present invention.

On the point of hindsight, the Examiner has cited *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA) 1971 (see Office Action, Section 7, page 3 bridging page 4). *In re McLaughlin* states that hindsight reasoning cannot be used in an obviousness argument, which must take into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made. This knowledge does not include knowledge gleaned only from the Applicant's disclosure.

Furthermore, the Office Action states that "Applicant argues that his invention produces expected results." However, the Applicant states that his invention produces unexpected and surprising results. According to the Office Action, the combination of the prior art references Hoffert, Clark, and Munk would produce the same results. Hoffert '288 does not solve the technical problem of the present invention. The passages of Hoffert '288 cited by the Examiner have been commented on in detail in the previous response filed March 3, 2011, which should be referenced for additional information. None of the recited passages deal with the technical problem of the present invention. Furthermore, the combination of Hoffert with Clark and Munk does not produce the results of the present invention. It is sufficient to see that Hoffert '288 is

not dealing with an isothermal reactor, as all the inlet points of the oxygen and fuel are cold zones. Moreover, in Hoffert '288, the non-combustible material that is converted into slag will build up on the walls of the reactor.

Even admitting, arguendo, that item 17a (mistakenly shown as 7a in Fig. 1 of '288) can be used as tube for the discharge of the slag, the incombustible slag will, without saying, build up on the reactor walls as the slag does not remain liquid and becomes solid due to cold zones on the walls in the Hoffert '288 reactor. Therefore, the reactor of Hoffert in the hypothesis made by the Examiner will not work when ashes are present in the combustible and melt (e.g., see below).

The Office Action also asserts that Hoffert '288 discloses an operating temperature of 2700-2800°C at col. 12 lines 53-57. The Applicant remarks that in the reactor of Hoffert '288 there are cold zones. As such, a very low TOC and a negligible volatile ash content cannot be obtained in combustion fumes outletting from the reactor of Hoffert '288. Moreover, the reactor in Hoffert '288, by melting ash containing combustibles, becomes inoperative due to the clogging of the reactor by the build-up of solid ash in the cold zones.

The Office Action also indicates that a very low TOC may be obtained in the asserted combination of references when the temperature is above 1200°C, according to Kasin (col. 2, lines 41-48). However, the Office Action fails to take into consideration that the process of Kasin is carried out by using two combustion chambers. The present invention, in accordance with the features of Claim 1, uses only one combustion chamber. For this reason alone, the process of the present invention is not obvious over the combination of references in the Office Action. Rather, the Office Action relies

on statements made in the Specification of the present application to interpret the prior art. One skilled in the art must rely on the prior art without the knowledge of the solution of the technical problem as provided by the present invention, only the knowledge of the technical problem to be solved.

The statement of Section 3, on page 2, of the Office Action, is a demonstration of the hindsight discussed above, because the incombustible slag will build up in the reactor of Hoffert and so the apparatus of Hoffert becomes inoperative with the time when the combustile contains incombustible melting slags.

The Office Action argues that obviousness of the combination of Hoffert and Munk is explained by the fact that the skilled in the art would obtain "the added benefit of reduced NOx emissions and a more efficient combustion process and with the pure oxygen combustion parameters of Clark USP '029 for the additional benefit of reducing/eliminating the production of nitrous oxide emissions." According to the Office Action, the combination of Hoffert and Munk provides predictable results.

Contrary to the Office Action's assertion, it should be noted that the Kasin reference, as cited at col. 2, lines 41-48, states that "..., while a too high temperature will increase the amount of NOx...". Thus, Kasin is suggesting to operate at temperatures below 1200°C (col. 2, lines 47-49). At the high and very high temperatures of the process of pending claim 1, the present invention has NOx present. Therefore, one skilled in the art would not be motivated to make the combination asserted in the Office Action, for the technical problem of the present invention was not to reduce NOx but to produce a very low TOC and a negligible volatile ash content.

As to the motivation cited in the Office Action for using pure oxygen as described in Clark, the Office Action does not consider that nitrogen is also present in the combustion fuels, in general. The Office Action must indicate in the prior art cited a passage that would bring the skilled in the art to combine the references in order to solve the technical problem of the present invention. The bonus effect (additional benefit) is irrelevant for the skilled in the art because there is no indication in the prior art cited by the Office Action that the combination of Hoffert and Munk would solve the technical problem.

With respect to the argument made in Section 5, on page 3 of the office Action, as discussed above, even admitting, arguendo, that item 17a (mistakenly shown as 7a in Fig. 1 of '288) can be used as tube for the discharge of the slag, the incombustible slag will obviously build up on the reactor walls as the slag does not remain liquid and becomes solid due to cold zones on the walls in the Hoffert '288 reactor. As those skilled in the art would recognize, a hammer has to be used, or an apparatus for drilling is necessary, to remove the incombustible slag from the walls. Thus, it is clear that the features of claim 1 are not nobvious over the combination of the prior art relied on by the Examiner and completely different from the process used by Hoffert for solving a problem very different from the problem being solved by the present invention.

With respect to the arguments in Section 6, on page 3 of the Office Action, the Examiner has missed the fact that quench air is injected before the gas outlet and therefore the melt slag sticks to the surfaces.

Furthermore, with respect to the arguments in Section 8, on page 4 of the Office Action, the Applicant respectfully submits that by applying the conditions of Munk to Hoffert, an isothermal reactor cannot be obtained.

According to the Applicant's experience in this field, even with the presence of the other combination of features of claim 1, by working with air, it is not possible to obtain the results of a very low TOC and a negligible volatile ash content as the solution of the technical problem of the present invention. The combination of references asserted in the present Office Action, including the Clark reference, which was not cited in the previous actions, provides a combination of the prior art which does not solve, as a matter of fact, the technical problem of the present invention. The arguments with respect to the combinations asserted in the Office Action are based upon speculation and fail to cite any passage in the prior art indicating that the combinations are capable of solvibng the technical problem of the present invention. The Applicant respectfully requests that any future Office Action provide support indicating that the combination of the prior art used for independent process claim 1 arrives at the claimed results as shown in the Malavasi Declaration. One skilled in the art would only look at the prior art to solve his technical problem and would not be interested in any bonus effects.

In other words, obviousness resides in the fact that one skilled in the art would be able to find in a prior art reference a motivation that the combination of the prior art relied on by the Examiner would solve the technical problem of the present invention. The cold zones and the isothermal reactor are features that the Applicant found out through extensive and costly research are crucial keys, in combination with the other features of claim 1, for solving the technical problem of the present invention. Therefore,

the Applicant reiterates that the obviousness rejections made in the Office Action do amount to an ex post facto analysis by using knowledge garnered from reading the disclosure of the present invention. The Applicant respectfully submits that the Examiner cannot interpret the prior art by using the knowledge of the present invention. In other words, the Examiner must indicate where in the cited prior art it describes that the combination of the prior art in the manner asserted would result in the solution of the technical problem of the present invention. The Applicant submits that there is no such support in the prior art for the asserted combinations, and, as such, pending claim 1 is allowable as novel and non obvious over the combinations of the prior art asserted in the Office Action.

Claim Rejection – 35 U.S.C. § 112

Claim 32 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 32 has been amended in a manner believed to be responsive to the Examiner's rejection. In the event the amendment will not be entered as being made after a final Office Action, and the remaining claims are deemed allowable, the Applicant respectfully requests cancellation of Claim 32 by Examiner's Amendment in the Notice of Allowance.

The Applicant respectfully requests withdrawal of the rejection.

Claim Rejections -- 35 U.S.C. 103

Claims 1-2, 7, 10, 28, 30 & 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,850,288 to Hoffert et al (hereinafter Hoffert) in view of US Patent No. 6,024,029 to Clark and further in view of US Patent No. 5,326,254 to

Munk. The Applicant respectfully traverses the rejection for at least the following combination of reasons.

The technical problem of the present invention is to provide a combustion process for combusting fuels of a wide range of types so that, at the mouth of the reactor, the produced combustion fumes have a very low TOC and very low volatile ash content (Page 9, P 3 of the Spec.) by using only one combustion chamber and without subjecting the flue gas to any post-treatment. The solution to the technical problem is provided by the combination of features recited in claim 1. The experiment described in the Malavasi declaration shows that the technical problem has been effectively solved: TOC are lower than 1 ppm and ashes are about 10 ppm or lower.

The closest prior art cited by the Office Action is represented by Hoffert. The technical problem of Hoffert was to provide a pressurized cyclonic combustion method and apparatus for particulate solid fuels providing very high volumetric heat release rates approaching those for liquid and gaseous fuels to produce a clean hot pressurized effluent gas stream (col. 3, lines 18-31). This problem is completely irrelevant for the process as claimed in pending claim 1.

For the obviousness analysis, the Applicant provides evidence as to the discrepancies between the technical objectives and relevant problems to be solved by the cited references in the Office Action versus the technical problem solved by the invention of claim 1. It is quite clear to the skilled in the art that the solution of different problems requires different tools, which are incompatible with each other in the vast majority of the cases. The Applicant's arguments on non obviousness have been consistently rejected by the Examiner in view of the Examiner's assertion that the

combination of the prior art used by the Examiner pushes the skilled in the art to the solution of the problem solved by the features in pending claim 1. As such, the Applicant submits that the skilled in the art must find in the prior art cited by the Office Action a motivation to combine the references in a manner to arrive at the solution of the technical problem of the present invention.

As a general rule, the Office Action must provide support to back up any arguments asserting that any feature of present claim 1 is taught or suggested by the prior art. A detailed review of the asserted prior art is provided below to clearly show that the cited references do not, in fact, alone or in combination, teach or suggest combining the references in the manner indicated in the Office Action to arrive at the solution of the technical problem solved by the present invention by virtue of the features recited in claim 1.

Hoffert

The skilled in the art knows that both top performing combustors and gasifiers, invented and designed for the specific aim of at least partially melt incoming ashes, regardless of the combustion temperature, can attain at most a slagging rate of 50 to 70% of the incoming ashes. Therefore, the skilled in the art also knows that slag combustors are not applicable to obtain quantitative melting and segregation of both fly and heavy ashes, which is part of the problem to be solved by the present invention.

Moreover, the skilled in the art knows that both slag combustors and slag gasifiers share the dominant problem of avoiding cold wall (even relatively colder wall zones, at temperatures below slag melting temperature). In fact, temperatures below melting produce molten slag solidification and build up, which causes clogging of the

apparatus and a removal from service. This is a mandatory condition to be respected according to the prior art on slag combustors.

An example of a slag combustor is available in the references cited by the Examiner, namely Staudinger '591. Staudinger sets out to solve the problem of ash accumulation in undesirable places in a gasifier apparatus, which affects the gasification (col. 1, lines 33-35) and, particularly, the prevalent problem of molten slag (col. 1, lines 36-38). The Staudinger solution to the above problem is to provide an apparatus with constricted passageway for ash removal, combined with a device for the feeding of granular coal and of reactant gases through the constricted passageway (cal. 1, lines 56-64). As shown in Fig. 1 of Staudinger, the solution includes a combustion reaction that is situated completely in the reaction or flame zone 11 of the reactor 10 (col. 2, lines 18-25, col. 3, lines 1-4), i.e. colder reactants are injected into the core of the combustor. Staudinger teaches that a high temperature is maintained at the apparatus walls so that the resulting byproduct ash "is kept under the form of liquid slag which readily falls...," (see col. 3, lines 5-10).

The overall teaching of Staudinger to the skilled in the art is the injection of relatively colder feedings directly into the core of the gasifier (i.e. far from walls) through the underneath constricted passageway for ash, in order to avoid molten slag build up (objective) by eliminating colder wall zones (problem to be solved by Staudinger), through injecting cold feedings directly into the core.

As explained above, the Applicant submits that the skilled in the art knows that, when dealing with molten slag (even partial melting), it is mandatory to secure the apparatus operational ability.

The arguments with respect to Hoffert, as provided in the response filed March 3, 2011, remain valid are reasserted and not repeated herein.

Additionally, the Applicant respectfully submits that one skilled in the art would note that Hoffert teaches the features of air tangential multiple inlets that appreciably cool down the refractory wall (col. 3, lines 7-17) to preserve refractory materials from degradation, which is also easily derivable from the cold feeding inlets tangentially affecting refractory wall temperature. Therefore, the skilled in the art would conclude that the Hoffert invention is not technically suitable (non applicable) to solve the problems of combustors/gasifiers dealing with molten slag.

In fact, Hoffert teaches a solution for a technical problem involving the higher conversion of solid combustibles (objective technical problem) by forcing solid combustible granules into tangential motion (the tool - solution) so that the bigger the combustible particle (the less converted by combustion reactions), the longer the residence time inside the combustor (col. 2, lines .17-45).

Solid fly ashes ("secondary" combustion particles) are not a technical problem of the Hoffert invention. They escape the combustor admixed with combustion fumes. Hoffert (col. 11, lines 33-38) teaches that the fly ashes can be removed, if any, afterwards by passing the fumes through a prior art cyclone of known efficiency. Moreover, the skilled in the art knows the "cutting size" of high efficiency cyclones is around 15 micron, which is of limited efficacy to remove ashes in order to get clean fumes. Therefore, the skilled in the art can only conclude that the Hoffert teaching is applicable to ash containing solid combustibles at combustion temperatures below ash melting temperature.

Any use of the device, as taught by Hoffert, at higher temperatures (Col. 4, lines 21-22, col. 12, line 58) is conceivable "if any" ash is ABSENT in the solid combustibles only. The Applicant has unexpectedly and surprising found that the combination of all the features of present claim 1 solves the technical problem of the present invention, i.e. to provide a very low TOC and a negligible volatile ash content in the combustion fumes at the mouth of the reactor. Hoffert is directed to a completely different technical objective/solution and a different technical problem, and the features of Hoffert are not relevant for the solution of the technical problem solved by the features of the present invention, as recited in claim 1.

Hoffert teaches away from the solution of the technical problem of the present invention. Furthermore, the Office Action does not cite a single passage of Hoffert wherein it is stated that the combustor of Hoffert is isothermal or quasi-isothermal at high or very high temperature above the melting point of the incombustible ashes (fly ashes). As discussed throughout the prosecution of the present application, Hoffert does not even mention the very low TOC. The applicant submits that the broad interpretations applied to the teaching of Hoffert are incorrect from the point of view of one skilled in the art and, as such, the motivations to combine Hoffert would any of the additional cited references is misguided.

Clark

The newly cited reference to Clark is directed to prior art solving the problem of maximizing the recovery of carbon dioxide produced in the combustion processes, as carbon dioxide has a greenhouse effect on the atmosphere (col. 1, lines 12-17). The Clark solution relies on a combustion process using oxygen instead of air to avoid a less

efficient recovery of CO_2 and to avoid the formation of NO_x from N_2 in air (col. 3 line 63 bridging, col. 4 line 12).

Firstly it is known to the skilled in the art that combustion of combustibles (any type) with oxygen introduces more problems than combustion with air. In fact, the skilled in the art knows that the positive trend of emissions along higher temperatures, in the range up to 1150-1200°C, reverts into a negative trend above 1200°C with a worsening of emissions. In addition, the skilled knows that ash melting (even partial) has to be avoided to reduce clogging.

Clark faces the problem of improving combustion with oxygen in order to reduce the complexity and cost of a CO_2 purification and recovery section. To do so, Clark first teaches splitting the combustion chamber into a primary chamber and a secondary combustion chamber (col. 3, lines 2 to 10). Second, Clark teaches to moderate the combustion temperature, below 1371°C with recycled fumes (col. 5, lines 60-65). Clark also teaches also moderation of the combustion temperature with water, though the injected water heat of vaporization is not recovered (col. 6, lines 49 to 52) and is completely lost into exiting fumes (negative impact on boiler yield). Clark teaches that the water injection enhances the ease of organic particulate scrubbing in the post-treatment of fumes during a water condensation condition. Third, Clark teaches cleaning the fumes through a post combustion treatment to abate inorganic incombustible particulate and organic non combusted particulate. All of the above is done to simplify the final CO_2 purification and recovery.

Accordingly, if for arguments sake, the skilled in the art were to generically combine Oxy-combustion with water addition, as suggested by the Office Action simply

because these conditions are mentioned in Clark for a completely different technical problem (i.e., recovery of carbon dioxide), the combustor of Clark undergoes the same problems of combustor of the Hoffert, i.e. the presence of cold zones. The Applicant submits that the conditions in the combustor of the prior art, where there are no isothermal or quasi isothermal conditions, produce relevant combustion byproduct formation. In fact, Clark solves this problem through post-treatment of the fumes.

Accordingly, the Applicant respectfully submits that Clark also does not teach or suggest the combination of features recited in claim 1 for solving the technical problem of the present invention and, in particular, the isothermal or quasi-isothermal conditions in the combustor. In fact, Clark does not give any indication that it was possible to obtain a clean flue gas with a very low TOC and a negligible volatile ash content, without any post treatment. On the contrary, Clark teaches away from the features of claim 1, as his process works under conditions that, according to the Applicant's experience, prevent the combustor from operating under isothermal conditions. The Applicant has found surprisingly and unexpectedly that only through the combination of all the features of claim 1 is it possible to reduce the TOC and volatile fly ashes to a negligible amount in combustion fumes.

The Applicant submits that the asserted teachings of Hoffert and Clark, i.e the splitting into two combustion chambers plus the enhancement of fumes post-treatment, does not represent any incentive to the skilled in the art to combine the combustion parameters taught by Hoffert and Clark to provide a solution to the technical problem solved by the combination of features of claim 1.

Munk

The Applicant respectfully refers to the previous arguments made in the previous responses with respect to Munk. Moreover, the Applicant respectfully submits that there is no motivation for combining Munk with Hoffert and Clark as asserted in the Office Action to solve the technical problem of the present invention.

It is known in the art that recycled fumes reduce flame combustion temperature in boilers, thus reducing NOx emissions and improving boiler efficiency (col. 1, lines 29-37). The skilled in the art knows this tool can be used in a limited way (no more than 25% of recycle referred to infed fresh air) because of too low combustion temperatures which trigger flame instability (see Munk col, 1, lines 50-60), and the worsening of overall emissions.

Munk teaches to swap some (or all) of the recycled fumes with water injection, in order to increase the water content of the combustor feedings within flame instability limits and to attain further reduction in noxious emissions without undue sacrifice of flame stability and/or burner efficiency (col. 1, lines 57-60). Munk states that the recirculated gases and air can be separately fed to the burner or they can be admixed at any point (col. 2, lines 64-68).

First of all, the skilled in the art knows that, no matter the amount of recycled fumes, the maximum water concentration in the feedings is inferior to the cutlet fumes water concentration, which is equal to air humidity plus the water chemically produced by the combustion reaction. Few algebraic calculations leads to 1.5% volume (conventional) fresh air humidity plus, for example, burning coal, about 8% volume 'chemical" water in outlet fumes. With recycled fumes at 25%, the overall feedings

concentration goes to 3.1% volume (1.5 + 1.6).

Munk also teaches swapping completely the recycled fumes with sprinkled water. In this case, the skilled in the art can calculate the % by volume of sprinkled water: this corresponds to 4% by volume. The skilled in the art knows also that any additional quantity of water injected into the overall feedings produces drawbacks both for flame instability and boiler yield. For the latter, a rise up to 10% of overall feedings produces a heat recovery cycle yield decrease already at 3%.

Munk teaches to the skilled in the art a proposed tool, i.e. that the water content into feedings is a valid tool to improve combustion process and reduce noxious emission (NOx). However, it is applicable within narrow limits (< 4% volume in overall feedings), because of flame instability and cycle yield penalties drawbacks. Therefore, Munk is non applicable for the solution of the technical problem of the present invention, as the combination of Hoffert and Munk does not solve the technical problem of the present invention. The Applicant unexpectedly and surprisingly, contrary to any teaching of the prior art, has found that only by using the combination of features of claim 1 is it possible to arrive at the solution to the technical problem of the present invention, i.e. a very low TOC and a negligible volatile ash content of the combustion fumes at the mouth of the reactor.

Rather, the Applicant submits that Munk teaches the skilled in the art that by combining Hoffer and Munk it would never be possible to arrive at the solution of the technical problem of the present invention. In fact, Munk teaches decreasing the combustion temperature in order to reduce NOx emissions. The combination of these two references, Hoffert and Munk, does not solve the technical problem of the present

invention as to the very low TOC and negligible volatile ash content in the combustion process of the present invention. The combination of these two references teaches away from the solution to the technical problem of the present invention. In fact the Applicant has surprisingly and unexpectedly found that only by working with an isothermal reactor, combined with the other features of pending claim 1, is it possible to arrive at the solution of the technical problem of the present invention. The achievement of this result is completely unexpected and surprising in view of the combination of Hoffert and Munk.

The Office Action interprets the "opacity" to IR radiation (given by water) as obvious per se. The Applicant would emphasize, only, that the invented combination of combustion parameters of pending claim 1, allows one to obtain an isothermal reactor, which, in combination with the other features of pending claim 1, solves the technical problem of the present invention. The Applicant unexpectedly and surprisingly found that the combination of features of claim 1 attained infrared heat tele-transmission (different from direct-contact forced convection) at a level of 500-800 Kw/m^2 so to eliminate cold zones and to attain isothermal high temperature conditions to get a very low TOC and a negligible volatile ash content in the combustion fumes at the mouth of the reactor. Accordingly, the teaching of Munk is therefore not pertinent.

The combination of Hoffert plus Clark plus Munk at most suggests to the skilled in the art a device for combustion temperatures below ashes melting temperatures, and water concentration in the overall feeding up to 4%, with a first combustion chamber and a second combustion chamber, and a treatment of flue gases to purify them from organic substances and fly ashes.

Therefore, the combination of Hoffert plus Clark plus Munk suffers in that it does not give any indication to the skilled in the art how to solve the technical problem of the present invention without using two combustion chambers and with no post treatment of the flue gases. The combination is made by the Examiner by using hindsight, as no motivation exists in these references for the skilled in the art to solve the technical problem that is solved by the present invention. The combination of Hoffert, Clark and Munk is not able to eliminate cold zones and obtain isothermal conditions with the resultant quantitative melting and coalescence of incoming ashes, all in one combustor with total conversion of the combustible portion of the incoming fuel (any morphology), to give very low TOC and very low ash content in the outletting fumes.

For at least the combination of reasons provided above, the Applicant submits that Hoffert, Clark, and Munk, alone or in combination, fail to teach or suggest, and actually teach away, from the features recited in independent claim 1. Accordingly, the Applicant submits that the combination of features recite in claim 1 are not obvious in view of the combination of Hoffert, Clark and Munk, as the combination of Hoffert, Clark and Munk fails to solve the technical problem of the present invention and becomes inoperative when melting ashes are present.

Claims 3-4, 6, 12-13 & 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claims 1-2 above, and further in view of US Patent No. 6,848,375 to Kasin. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claims 1-2 above, and further in view of US Patent No. 4,022,591 to Staudinger.

Claims 14, 16, 18, 21-22, 28 & 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk and further in view of US Patent No. 6,883,443 to Rettig et al. hereinafter (Rettig). Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claim 14 above, and further in view of US Patent No. 6,145,452 to Heger et al. (hereinafter Heger). Claims 17 & 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claim 16 above, and further in view of Kasin. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claim 14 above, and further in view of Staudinger. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffert in view of Clark and Munk as applied to claim 1 above, and further in view of US Patent No. 4,993,332 to Boross et al.(hereinafter B0ross). The Applicant respectfully traverses the rejections for at least the following combination of reasons.

The Applicant submits that the same arguments provided above with respect to independent claim 1 also apply for independent claim 14. Claims 2-4, 6, 7, 10-13, 28 and 29 depend from Claim 1; and Claims 15-18, 21, 22, and 24-27 depend from Claim 14. Accordingly, for the same combination of reasons discussed above, the Applicant respectfully submits that any combination of Hoffert, Clark, and Munk with Kasin, Staudinger, Rettig, Heger and Boross, alone or in combination, does not teach or suggest each and every feature of independent claims 1 and 14. The dependent claims should be deemed allowable for the same reasons that claims 1 and 14, respectively, are allowable, as well as for the subject matter recited therein.

Furthermore, the references cited by the Office Action related to the dependent claims have already been commented upon in the previous response filed March 3, 2011, to which we hereby reference. In addition, the following remarks are provided with respect to Kasin and Staudinger.

Kasin

The skilled in the art knows that combustors and gasifiers can be subdivided into two major classes: short combustible residence time (some seconds), adopted for high efficiency high productivity combustors, and long residence time (some minutes) fixed bed combustible combustors, e.g. incinerators of urban wastes. For example, with reference to the prior art cited by the Office Action, Hoffert belongs to the former class and Kasin to the latter.

The skilled in the art knows combustion temperature in the bed of combustibles is dominated by oxygen concentration in the infed comburent, while the combustor gas phase is led by the overall thermal and material balance of the generated fumes. Kasin teaches to use cool recycle fumes to lower oxygen concentration (col. 4, lines 39-44) and to lower fixed bed combustion temperature, thus decoupling gas phase combustion temperature from fixed bed temperature.

Furthermore, the skilled in the art knows that, for high productivity short residence time combustors and gasifiers, it is highly recommended, as a general rule, to preheat cold feeding air (comburent) at the highest temperature (300°C) compatible with the cost and complexity of a preheating train in order to improve combustor efficiency. Therefore, the skilled in the art derives the conclusion that the teaching of Kasin is not applicable to the short residence time high efficiency combustor of the present

application, actually teaching exactly the opposite, the trend required for the combination of combustion parameters for the class taken under consideration.

Kasin is a further example of the concept that different objectives and different technical problems to be solved end up with a teaching that is not applicable to the invention under scrutiny. Consequently, the combination of Hoffert with Clark, Munk and Kasin involves a combination of non applicable technologies that would not suggest to one of ordinary skill in the art anything useful for solving the technical problem of the present application.

Staudinger

As discussed above, the skilled in the art knows that both top performing combustors and gasifires, invented and designed for the specific aim of at least partially melting incoming ashes, regardless of combustion temperature, can attain at most the slagging of 50 to 70% of the incoming ashes. Therefore, the skilled in the art knows that the teaching of Staudinger is not applicable to obtain quantitative melting and segregation of both fly and heavy ashes, which should be noted is the problem to be solved by the present invention. Staudinger teaches a method for avoiding build up and clogging by easing the discharge of molten slag into a quenching water bath.

The skilled in the art knows that, in Staudinger, the discharged slag solidifies into big chunks, mechanically extracted (transported from) from the quenching bath. Staudinger does not say anything more (i.e. anything different) from the known art.

In the present application, discharge through an independently heated port secures maintaining the molten slag at very low viscosity, and, in such a fashion, the quenching produces a break-up into much smaller beads, easy to transport in slurry in

water form. This renders easier the discharge of a solid from the pressurized environment. The skilled in the art does not derive any incentive to introduce a device to maintain high temperature free flowing molten slag in order to trigger the solid slag break up.

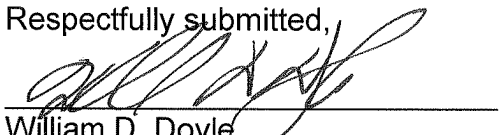
Conclusion

In view of the foregoing, the Applicant respectfully requests reconsideration of the application, withdrawal of the outstanding rejections, allowance of Claims 1-4, 6, 7, 10-18, 21-22 and 24-33, and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 108907-00043**.

Respectfully submitted,



William D. Doyle
Registration No. 60,429

Customer No. 004372
ARENT FOX LLP
1050 Connecticut Avenue, N.W., Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810